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Post-Stroke Sleep Disorders among Egyptian Patients

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Abstract

Background: **A significant global cause of disability and mortality is cerebral-vascular stroke. In neuro-rehabilitation, sleep may be of utmost importance. Sleep disruption may also make recovery and stroke outcomes worse. As separate, modifiable risk factors for cerebrovascular stroke, sleep disorders are becoming more well-acknowledged.** ***Aim:*** **To assess the pattern of post-stroke sleep disorders among Egyptian patients.** ***Subjects and Methods:*** **The Suez Canal University hospital's neurology and psychiatry outpatient clinics conducted this case-control research on 43 stroke patients who had experienced a stroke during the previous three months (the Patient Group) and 43 healthy persons (Control Group). The Pittsburgh Sleep Quality Index (PSQI), which was also used to evaluate the quality and pattern of sleep, was used to make the diagnosis of sleep disorders based on the Diagnostic and Statistical Manual (DSM-5) criteria.** ***Results:*** **Regarding Obstructive Sleep Apnea (OSA) and Parasomnias, there were statistically significant differences between the two groups (p 0.002 & 0.001, respectively). The Pittsburgh Sleep Quality Index (PSQI) total score showed a significant difference between the two groups, with stroke patients having a higher percentage of poor sleepers (score >5).** ***Conclusion:*** **Significant links exist between sleep problems and stroke. Stroke has been shown to decrease sleep quality and increase the incidence of parasomnias and obstructive sleep apnea.**

Keywords: Sleep Disorders, Sleep Quality, Parasomnias, Obstructive Sleep Apnea, and Cerebro-Vascular Stroke

Introduction

Sleep is a cyclic, brief disruption of attention in which all motor functions are deactivated. Sleep causes a person's awareness of their surroundings to be at its lowest point. However, there is a high threshold for responsiveness and reflex irritation(1). Numerous sleeping problems frequently cause disruptions to sleep cycles and the entire process (SDs). Sleep disturbances are a common issue that can have serious negative implications on a person's physical, psychological, and social health. It is alleged that compared to healthy persons, those with sleep disturbances have greater rates of illness and mortality. Additionally, the patient and

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the health services are both financially burdened[2]. The term "sleep disturbance" refers to aberrant sleep duration and awake patterns. It frequently follows a stroke, takes many different forms, and affects stroke patients' functional status. A person's everyday life, cognitive abilities, and endocrine system all benefit from good sleep quality; as a result, sleep disturbances can have a negative impact on many areas of a person's health, including their physical and emotional well-being. Sleep disturbance is linked to PSD in stroke patients as well as the rehabilitation outcomes for those who have had strokes [3]. A stroke is an abrupt stoppage of the blood flow to the brain that is accompanied by either temporary or permanent brain impairment. Hemorrhage and ischemia are the two primary diseases associated with stroke. Hemorrhagic stroke accounts for one-third of stroke patients, while ischemic stroke accounts for the other two-thirds. SDs are very usually associated with both forms of stroke[4]. Following a stroke, people frequently have a variety of SDs for which they seek out a variety of medical treatment providers. Early identification of post-stroke SDs will benefit patients' efforts, health, quality of life, and financial resources[1]. Insomnia, hyperinsomnia, obstructive sleep apnea (OSA), and restless leg syndrome (RLS) are the four primary categories of post-stroke symptoms[5]. The prevalence of insomnia following a stroke ranges from 12 to 37%, and it is frequently accompanied by daytime weariness, irritability, and in the long run, diabetes, and depression[6]. An estimated 5% of stroke survivors experience post-stroke hypersomnia[7]. Stroke is thought to be both a result of and a cause of obstructive sleep apnea[8]. Because OSA increases the risk of recurrent stroke, worsens functional recovery, and raises mortality rates, it has a negative effect[9]. RLS is common in people who have had strokes, especially those who had ischemic strokes[10]. As a result, post-stroke sleep disturbances are frequent and dangerous, slowing healing and impairing cognitive and physical abilities. The estimated incidence ranges from 21 to 77%[11]. In the current study, we aim to identify sleep disorders among post-stroke patients.

Subjects and Methods

A case-control study in which Suez Canal University hospitals were used to recruit a random sample of stroke victims. A total of 43 patients made up the patient group, and a total of 43 people made up the control group. Both groups were matched for age and gender. Patients under the age of 18 who have recently been diagnosed with stroke and are attending the neurology outpatient clinic at Suez Canal University hospitals. Healthy individuals who came to donate blood made up the control group. Individuals with a history of sleep issues prior to the stroke, psychiatric diseases in the past, substance use disorders, cognitive impairment, unwilling patients, and study refusals were not included in the study. After explaining the entire method, confirmed cases received informed consent, and the Faculty of Medicine Research Ethics committee's approval number was (3940). Patients' complete medical histories, including socio-demographic information, past and present medical histories, and the

Pittsburgh Sleep Quality Index, were recorded. The Diagnostic and Statistical Manual (DSM-5) criteria of the American Psychiatric Association were used to make the diagnosis of sleep disorders [12]. An expert in psychiatry verified the diagnosis. Also employed was the Pittsburgh Sleep Quality Index (PSQI). It is a self-administered questionnaire used to evaluate the consistency and quality of adult sleep during the previous month. It consists of 19 questions that evaluate seven factors: daytime dysfunction, habitual sleep efficiency, subjective sleep quality, sleep latency, sleep duration, and sleep disruptions. Each component has a value between 0 and 3, with 3 denoting the most dysfunction. A rating of five or higher suggests a lacklustre sleep pattern that calls for medical attention. There is no scoring for the bed partner's questions. Suleiman, et al.[13], with high validity correlation with insomnia severity index (r=.76) and reliability (cronbach's alpha = 65), translated the questionnaire into Arabic and then back into English. Additionally, strong reliability and validity studies in Egypt employed this variation to evaluate the quality of sleep in a sample of Egyptian medical students[14].

Statistical Analysis

The computer statistical program had been used to enter data that had been coded. SPSS statistical program for social science version 25 was used for all statistical studies [15]. Tables and graphs were used to present the data. Quantitative data were provided as mean Standard Deviation whereas qualitative data were presented as numbers and percentages. Tests that were both parametric and non-parametric were used when needed. Quantitative variables that are regularly distributed were subjected to the Student (t) test, whereas those that are not were subjected to the Mann-Whitney test. For qualitative variables, chi-square and Fisher's exact tests were employed. Statistics were judged significant at p 0.05.

Results

At the Suez Canal University Hospital's neurology outpatient clinics, a study involving 43 stroke victims who had experienced a stroke within the previous three months (the Patient Group) and 43 healthy individuals was conducted (the Control Group). Additional information regarding the study's conclusions is illustrated in the following diagrammatic and tabular forms.

Discussion

Our study's objective is to analyze the distribution of sleep problems among stroke survivors. Two groups were used in the study: a patient group and a control group with matched gender and age. 43 patients from each group were chosen using the aforementioned inclusion and exclusion criteria. stroke patients who attended the neuropsychiatric outpatient clinics of the hospitals affiliated with Suez Canal University. Participants in the control group were healthy people who came to donate blood. In our investigation, we discovered that there were no gender or age differences between the two analyzed groups. This is due to the fact that, as we already indicated in the methods

section, the two groups matched in terms of age and gender. In line with our findings, Campos et al.[16] showed that gender differences between stroke patients and healthy controls were not statistically significant (p = 0.139).

Table 1. Socio-Demographic Data of The Studied Groups

Socio-Demographic Data	Patient Group (n = 43) %	Control Group (n =43) %	*p* Value
Gender			
Male	44.2	37.2	0.510
Female	55.8	62.8	
Age (Years)			
< 55	65.1	76.7	0.410
≥ 55	34.9	23.3	
Age (Mean ± SD)	50.77 ± 10.99	46.37 ± 7.66	0.213

There is no significant difference between 2 groups as regard Age.

Table 2. Clinical Data of The Two Studied Groups

Clinical Data	Patient Group (n = 43) %	Control Group (n =43) %	*p* Value
Hypertension	83.7	7.0	<0.001**
Diabetes Mellitus	58.1	2.3	<0.001**
Smoking	44.2	34.9	0.378
Duration Since Stroke			
One month	37.2	NA	NA
Two months	23.3	NA	
Three months	39.5	NA	
Location of Stroke			
Right side	38.1	NA	NA
Left side	31.0	NA	
Brainstem	31.0	NA	
Type of Stroke			
Ischemic	55.8	NA	NA
Hemorrhagic	44.2	NA	

***: Statistically highly significant at p ≤ 0.001*

When comparing them based on age, however, this was not the case (P = 0.002) because the patient's group had a greater mean age. Glozier, et al.[6] found, in contrast to our findings, that there was a significant difference between the two analyzed groups regarding sex (P=0.001). In our investigation, we discovered that while diabetes and hypertension are already risk factors for stroke, their prevalence was higher among the patients than the controls. This variation was statistically noteworthy. However, there was little difference between the two groups in terms of smoking. Smoking is a risk factor for stroke as well, but the difference is not statistically significant due to smoking's high prevalence among healthy people. Glozier, et al.[6] study which found no significant difference

between the two analyzed groups (P= 0.08), refuted our findings on comorbid chronic illness. However, their findings matched ours in that there was no discernible difference between the two study groups (P= 0.36). The majority of the patients in our study had ischemic strokes, and the majority of them reported having experienced a stroke two months prior to the data collection. In addition, our research revealed that the left side was the location of strokes that occurred most frequently. Huang, et al.[17] concurred with our findings regarding the side of affection, but their findings were different from ours about the most common type of stroke; they stated that the majority of the patients they recruited had hemorrhagic strokes. Obstructive sleep apnea (OSA) and parasomnia, which were more common in the cases group, were shown to be significantly different between the two study groups in the current study (p=0.002, 0.001, respectively). A significant portion of stroke patients, between 20% to 63%, exhibit various sleep abnormalities, including hypersomnia, insomnia, parasomnias, circadian rhythm problems, periodic limb movement disorder, and sleep-disordered breathing, according to research by Kernan et al.[18].

Table 3. DSM-5 Diagnosis of Sleep Disorders among the Studied Groups

Sleep Disorders	Patient Group (n = 43) %	Control Group (n =43) %	*p* Value
Insomnia	48.8	36.5	0.629
Parasomnias	18.6	0.0	0.001**
Obstructive Sleep Apnea	20.9	6.0	0.002**
Hypersomnia	16.3	14.0	0.763
No Disorder	25.6	43.5	0.631
Any Sleep Disorder	74.4	56.5	0.041*

**: Statistically significant at p ≤ 0.05, **: Statistically highly significant at p ≤ 0.001*

Mansour et al.[19], demonstrated that 70.6% of people experienced sleep difficulties, this is unquestionably a major problem. 10.7% of people with 14.7% insomnia had it as a child. The risk of insomnia for sympathetic hyperactivity and increased cerebrovascular reactivity (CVR) is independent. Insomnia prevalence after stroke ranges from 14% to 59% in studies using clinical diagnostic tools and from 19.8% to 69% using non-clinical diagnostic tools and a variety of diagnostic questionnaires, according to Baylan et al.[20] systematic .'s review on the subject One study in the systematic review also found a link between cortical lesions and poor sleep quality. According to Brown et al. [21], sympathetic overactivity and decreased cerebral blood flow are the possible causes of several sleep problems, including insomnia, SDB, and periodic leg movements, as well as the start of strokes. The proper therapy of these illnesses is essential for stroke secondary prevention and may reveal and clarify the causes of recurrent strokes in patients who are receiving the best care. In terms of daytime dysfunction, sleep disruption, and sleep efficiency, our findings for (PSQI) showed that there was a highly

significant difference between the two study groups (p value< 0.001). In terms of sleep latency, there was a substantial difference between the two groups that were (p-value = 0.003). The difference in sleep latency between the two groups is less than the difference in the rest of the sleep components of the PSQI, which may be related to the rising prevalence of insomnia in the general population.

Table 4. Pittsburgh Sleep Quality Index Results among the Studied Groups

Pittsburgh Sleep Quality Index	Patient Group (n = 43) %	Control Group (n =43) %	*p* Value
Subjective sleep quality			
Very Good	30.2	23.3	
Fairly Good	46.5	60.5	0.325
Fairly Bad	23.3	14.0	
Very Bad	0.0	2.3	
Sleep Latency			
0	23.3	46.5	
1-2	34.9	44.2	0.003*
3-4	30.2	9.3	
5-6	11.6	0.0	
Sleep Duration			
> 7 hours	23.3	76.7	
6-7 hours	46.5	18.6	<0.001**
5-6 hours	25.6	4.7	
< 5 hours	4.7	0.0	
Sleep Efficiency	32.6	76.7	
> 85%	39.5	20.9	<0.001**
75-84%	23.3	2.3	
< 65%	4.7	0.0	
Sleep Disturbance			
0	18.6	67.4	
1-9	55.8	32.6	<0.001**
10-18	20.9	0.0	
19-27	4.7	0.0	
Use of Sleep Medication			
Not during past month	100.0	97.7	
<1 time a week	0.0	2.3	1.000
1-2 times a week	0.0	0.0	
3 or more times a week	0.0	0.0	
Daytime Dysfunction			
0	18.6	74.4	
1-2	41.9	25.6	<0.001**
3-4	30.2	0.0	
5-6	9.3	0.0	

**: Statistically significant at p ≤ 0.05, **: Statistically highly significant at p ≤ 0.001*

When researching the effectiveness of sleep during the chronic stage of stroke healing, Backhaus et al.[22] discovered similar outcomes. They saw more midday naps and longer sleep duration as well. The authors claim that these adjustments make up for the patients' poor sleep quality, indicating that they experience behavioral changes to make up for the effects of a stroke. Furthermore, Campos et al. [16] reported that multiple linear regression analysis revealed that reduced sleep efficiency-which may signify less deep or intense sleep-was the best predictor of poor sleep quality. This outcome can be attributed to the high prevalence of trouble falling asleep and fragmented sleep. Additionally, Müller, et al.[23],discovered that stroke patients had less efficient sleep than the control group and woke up more frequently after falling asleep. The complaints of difficulties falling asleep and fragmented sleep suggest the presence of insomnia in this study population. Insomnia is defined as a problem falling or staying asleep, or as non-restorative sleep that limits daytime performance. Likewise, Leppävuori, et al.[24] came to the same result and discovered that insomnia was a prevalent complaint following ischemic stroke. Additionally taken into consideration as predictors of the patient's sleep quality were daytime dysfunction, latency, and sleep duration. Additionally, Mansour et al.[19] found that 17.3% of patients had severe EDS, including breathing disorders that interfere with sleep. Eight patients (10.6%) had a severe form of apnea, compared to 14 patients (18.7%) who had a moderate form. Overall, 61.3% of people had trouble sleeping, defined as scoring higher than 5 on the Pittsburg sleep scale. Our analysis of (PSQI) score revealed a significant difference between the two study groups in terms of the total score, with the cases group having a higher percentage of poor sleepers (score >5) than the controls (18.6%), indicating a high prevalence of sleep disorders among post-stroke patients. Similar to this, Karaca, et al.[25] demonstrated that 39.1% of the patients had post-stroke sleep disturbances based on PSQI ratings. Stroke is linked to the existence of one or more sleeping problems, according to Foley, et al.[26] analysis of the relationship between sleep issues and chronic illnesses. In line with our findings, Campos et al.[16] reported that the PSQI analysis revealed that 57.5% of patients had poor sleep quality, compared to only 26.7% of healthy people (p = 0.01). According to Sterr et al.[27], substantial disparities in overall PSQI scores suggested that patients had worse sleep than controls (6.93.1 vs. 5.12.8).

Table 5. Comparison between the two Studied Groups According to the score of Pittsburgh Sleep Quality Index (PSQI)

Pittsburgh sleep quality index (PSQI)	Patient Group (n = 43)	Control Group (n =43)	*p* Value
	%	%	
Total Score			
Good sleepers (≤ 5)	37.2	81.4	<0.001**
Poor sleepers (> 5)	62.8	18.6	
Mean ± SD.	6.77 ± 3.97	2.19 ± 2.67	<0.001**

***: Statistically highly significant at p ≤ 0.001*

Therefore, when utilizing the 5 PSQI criterion, patients were more likely to be classified as poor sleepers (14/19 vs. 10/21). In their sleep diaries, patients also indicated that they slept substantially less efficiently than controls. We discovered in the current study that there were no discernible differences in gender or age between the case group's good and poor sleepers. According to Karaca, et al. [25], there was no gender difference in sleep quality, which is consistent with our findings. However, Palomeras, et al.[28], hypothesized that women had poorer sleep quality. Additionally, El-Tantawy, et al.[2] found no differences in age, sex, socioeconomic status, or level of education that were statistically significant, but they did find that being married and unemployed appeared to be risk factors for sleep disorders among patients with anxiety or depressive disorders (P< 0.05).

Table 6: Relationship between Sleep Quality and Socio-Demographic and Clinical Data among Post Stroke Patients (n=43)

Variable	Good sleepers (≤ 5) (n = 16) %	Poor sleepers (> 5) (n =27) %	*p* Value
Gender			
Male	50	40.7	0.555
Female	50	59.3	
Age (Mean ± SD)	47.75 ± 9.79	52.56 ± 11.44	0.168
Smoking	43.8	44.4	0.965
Hypertension	75.0	88.9	0.394
Diabetes Mellitus	68.8	51.9	0.278
Cite of Stroke			
Left side	26.7	44.4	0.524
Right side	40.0	25.9	
Brainstem	33.3	29.6	
Type of Stroke			
Ischemic	56.2	55.6	0.965
Hemorrhagic	43.8	44.4	

No significant difference between quality of sleep and socio-demographic or clinical data.

Additionally, there was no discernible difference between the case group's good and poor sleepers in terms of blood pressure, diabetes, or smoking, according to the current study. According to Kim, et al.[29], who found similar results to our own, smoking, diabetes mellitus, and hypertension did not significantly affect PSQI-K, a measure of sleep quality. In our investigation, the kind and side of stroke did not significantly differ between those who slept well and those who did not. According to Karaca, et al.[25], there was no change in the quality of sleep between groups who had hemorrhagic or ischemic strokes, correlating with our findings. According to Pasic et al.[30], hemorrhagic stroke has a greater impact on sleep quality. The Karaca, et al.[25], study found no significant relationship between right-left cerebral involvement and sleep quality; however, this conclusion was not

supported by subsequent research. The right cerebral hemisphere is more frequently involved in individuals with post-stroke sleep disorders[30], but the left hemisphere is more frequently involved in these patients[31]. Further research is required because the results are ambiguous in this regard.

Conclusion

We can infer that there is a link between stroke and sleep disorders and that a stroke is found to make sleep disturbances worse. The likelihood of parasomnias and OSA is increased by stroke. No matter if there has been a stroke or not, insomnia and hypersomnia appear to be equally prevalent. To prevent secondary stroke, we recommend regular testing for sleep disturbance after strokes. While, for primary stroke prevention, patients with sleep disturbances should be checked for stroke risk factors. To enhance sleep quality, therapeutic interventional programs that target post-stroke sleep problems are required. Cohort studies with a larger sample size to confirm the link between post-stroke sleep disturbances and their underlying causes are recommended.

Limitations

The study was cross-sectional rather than cohort, thus we were unable to follow up on our cases. Also, polysomnography is too pricey for us to use. Moreover, our results' significance appeared to be affected by the small sample size.

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